Storm water

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EMI

Missouri Department of Natural Resources

No individual raindrop

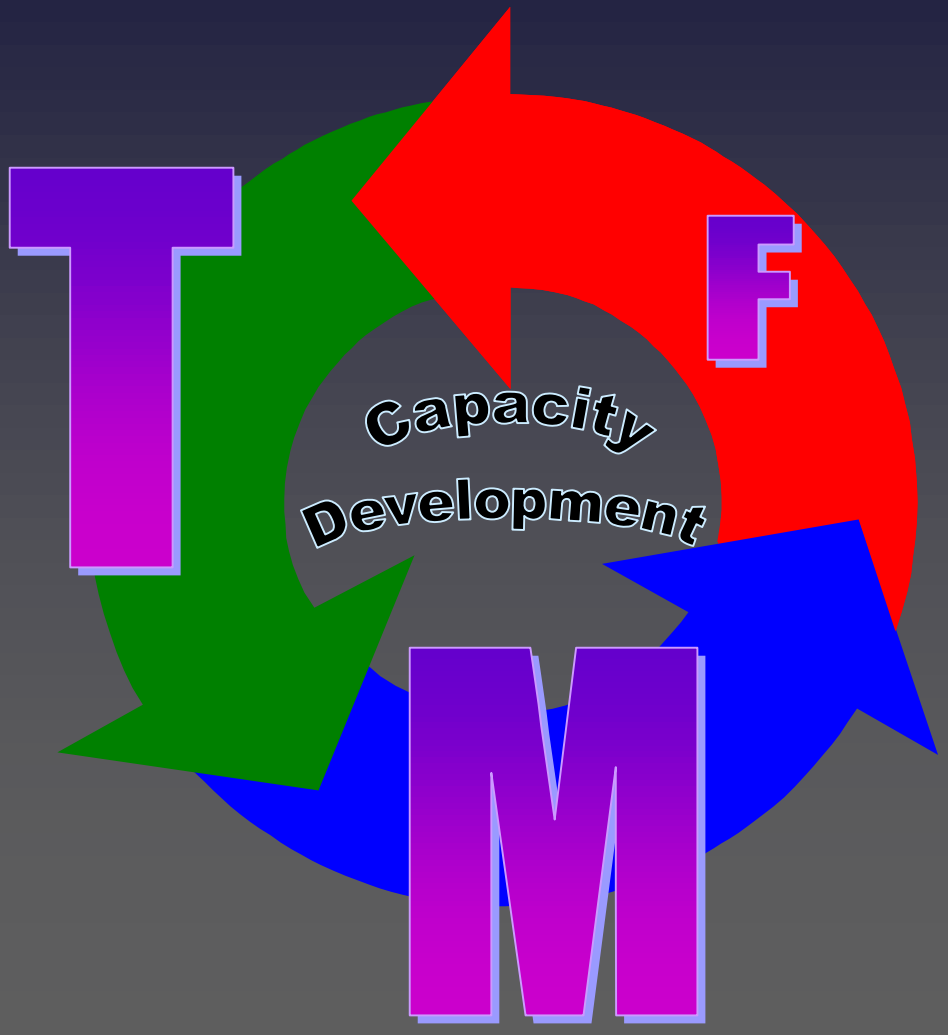

No individual raindrop
ever considers itself


No individual raindrop ever considers itself
responsible for the flood.
Anonymous

Agenda

- Storm water - what and why
- Planning and permitting
- Implementing management
- Technical and financial assistance
- Questions

TMF Watch



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Storm Water defined

Water that falls from the sky and runs off the land.

Storm on the Horizon

The Storm Water Problem Includes

- Runoff from disturbed, developing and developed areas
  - Volume (flooding, erosion) and
  - water quality (sediment, pollutants, temperature)
- Illicit sewer connections to the storm water system
- Poor control of chemicals and disease organisms
- Septic drain-field bypassing

Storm Water Permitting (10 CSR 20-6.2)

Phase I

- Communities over 100,000 population
- Land disturbance over five acres
- Categorical industries

Storm Water Permit Criteria

Phase II permitting started March 10, 2003

Phase II - Non-municipals

- Land disturbance from 1-5 acres
- Exemptions for industries that eliminate storm water exposure

Storm Water Permit Criteria

Phase II - Municipals (154 cities and counties, maybe more when 2000 census data is out)

- Cities >10,000 population
- Smaller cities and developed areas in urban areas with 1,000/square mile (maybe 500) density

What Will Your Program Cost?

Program Level	Cost/Person/Year
Minimal	$3 to $5
Medium	$30
Exceptional	$50

Phase II Guidance and Training Opportunities

- We did Phase II workshops in 2001 & 2002
- RPCs, MDC, NRCS, MoWIN and others
- Our Resource Bibliography, www.dnr.mo.gov/oac/pub149.pdf

Storm Water Program Components

1. Public education and outreach
2. Public Involvement
3. Illicit discharge elimination
4. Land disturbance runoff control
5. Post-construction storm water management
6. Pollution prevention in municipal operations

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Working Definitions

Impervious Cover: Building roofs, paved parking lots and streets.

Impaired Cover: Bare soil, compacted soils, areas converted from deep-rooted plants (trees and prairie grasses) to shallow-rooted plants (lawn grass.)

Healthy Cover: Almost anything that breaks the fall of raindrops and allows infiltration.

Working Definition

Best Management Practices (BMPs):

Minimizing soil and site disturbance; using natural covers, features and techniques; and using straw bales, silt fences, storm water handling structures and the like to minimize soil erosion and detrimental stormwater runoff.

Storm Water Facts

% Impervious Cover and its Effects

- 10% Threshold for watershed changes
- 25% Difficult to maintain habitat and uses
- 35% "People habitat"
- 65% "Car habitat"

Residential developments are commonly about 35% impervious.


Storm Water Impacts on Communities
Erosion

Storm Water Impacts on Communities

Sedimentation

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Storm Water Impacts on Communities

Sedimentation

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Storm Water Program Components

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Public Involvement

- Citizens, contractors and others do not usually understand or want to face stormwater issues.
- You must plan well and involve citizens in decisions to succeed.
- Remember the public meetings recommendations.

Involving Stakeholders

1. Identify them
2. Gather them by meetings, calls, Internet, etc.
3. Define your storm water goals
4. Hone your message, aim it directly at your target audience

Involving Stakeholders

5. Create outreach and informational materials and other techniques
6. Get the materials/information out there
7. Evaluate effectiveness

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What is Illicit Discharge?

Anything that is not storm water.

If it is not storm water and it is a problem, it shouldn't be mixed in the storm water.

Illicit Discharge Elimination

An illicit discharge is any connection of wastewater systems to the storm sewer system or natural drainageways. They include:

- Septic drainfield lines that "daylight" and malfunctioning septic systems
- House sewer lines
- Floor drains
- Illegal dumping

Illicit Discharge Elimination

To eliminate them:

- Educate public, builders and plumbing contractors
- Test and inspect sewer and storm water lines and water quality
- Re-plumb as needed
- Adopt an illicit discharge ordinance

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What is Good Storm Water Management During Construction?

1. Get a reasonable amount of water back into the ground,
2. Convey leftover water to stream courses without undue erosion, sedimentation, habitat and water quality degradation or flooding.

General Land Disturbance Runoff Control Strategies

Avoid removing soil-protective cover.

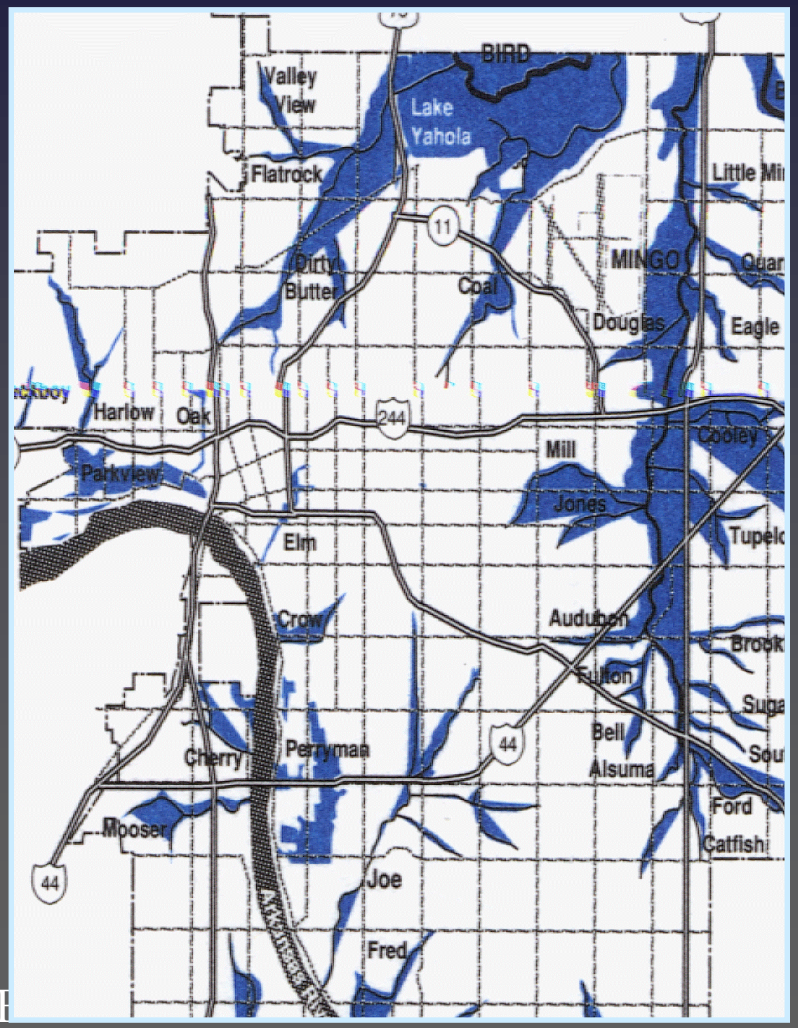
Minimize making impervious surfaces.

Do not develop in flood-prone areas.

Increase storm water infiltration, detention and retention surfaces and facilities.


Do flood plain friendly
development

Storm Water Management Methods



- Control by municipal actions
  - Do community-based storm water planning

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Storm Water Management Methods

STORM WATER RUNOFF MANAGEMENT ORDINANCE

An ordinance adopting regulations designed to ...

Section 1. Purpose. In order to promote the public health, safety, and general welfare of the citizens of ...

Control by ordinance

- State goals, cite standards or BMPs to achieve goals, and state penalties for non-compliance
- Use other communities' ordinances as templates, http://www.dnr.mo.gov/oac/emiapps.htm

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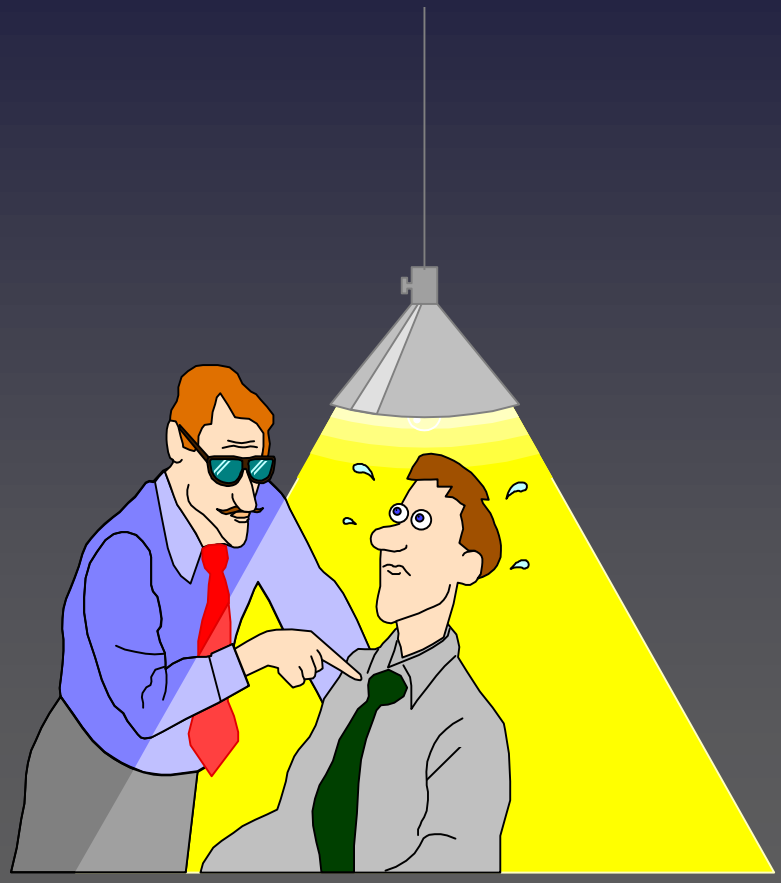
Storm Water Management Methods

Control by negotiation with developers

- Develop well thought out storm water goals and policies, then talk developers into helping the community achieve them
- Be consistent



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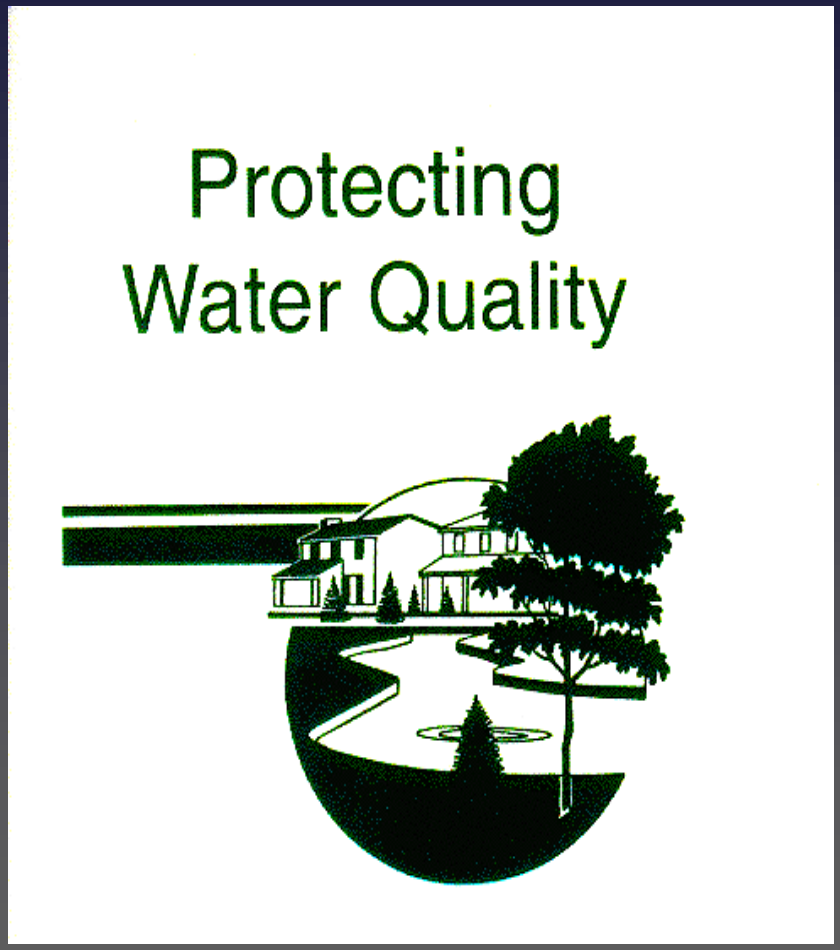
Storm Water Management Techniques



Require best management practices (BMPs)

A field guide to erosion, sediment and storm water best management practices for development sites in Missouri

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Slide Tour

The “do’s and don’ts of storm water management for land disturbers

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Do!!!


Don’t


Do


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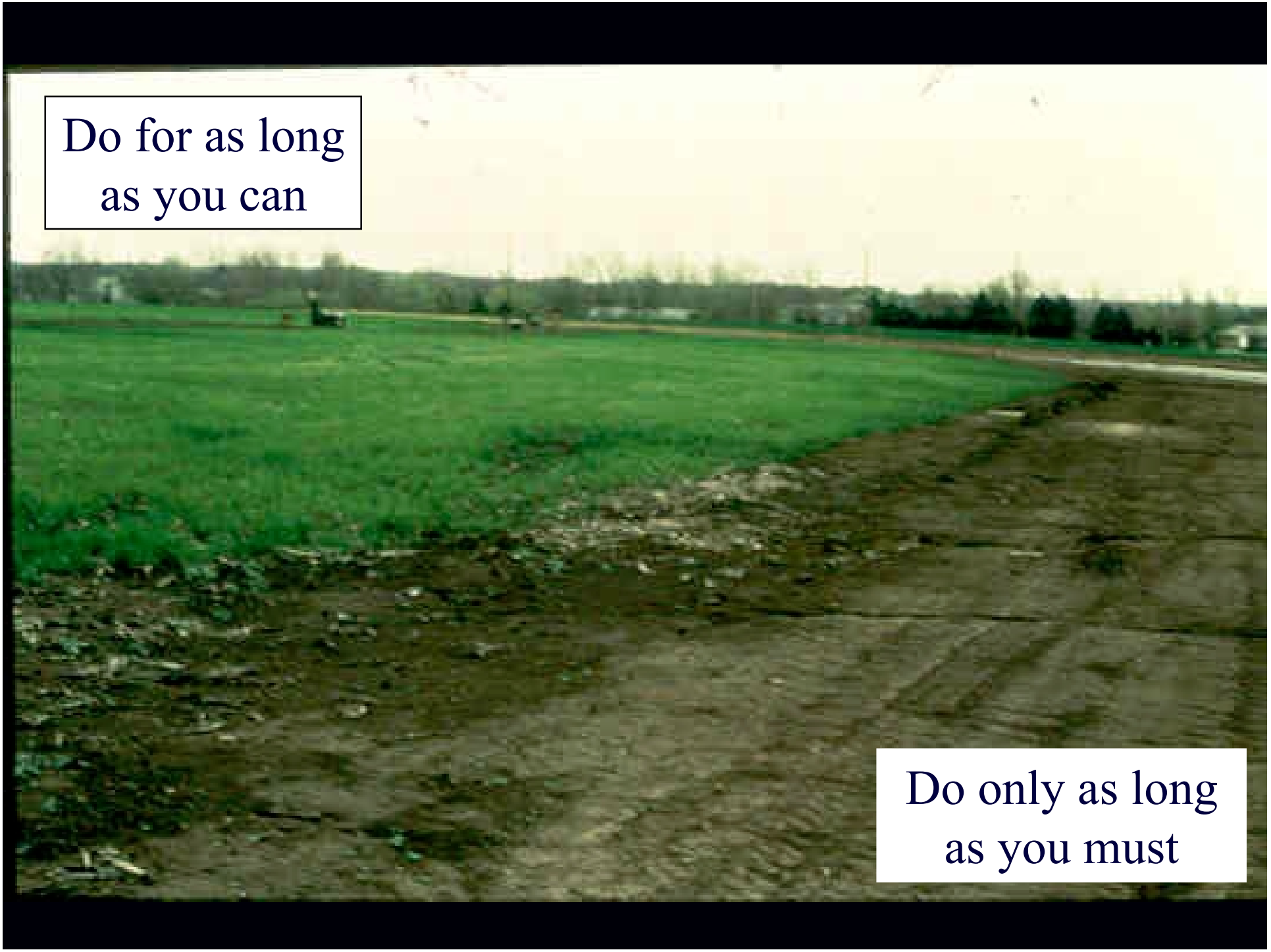
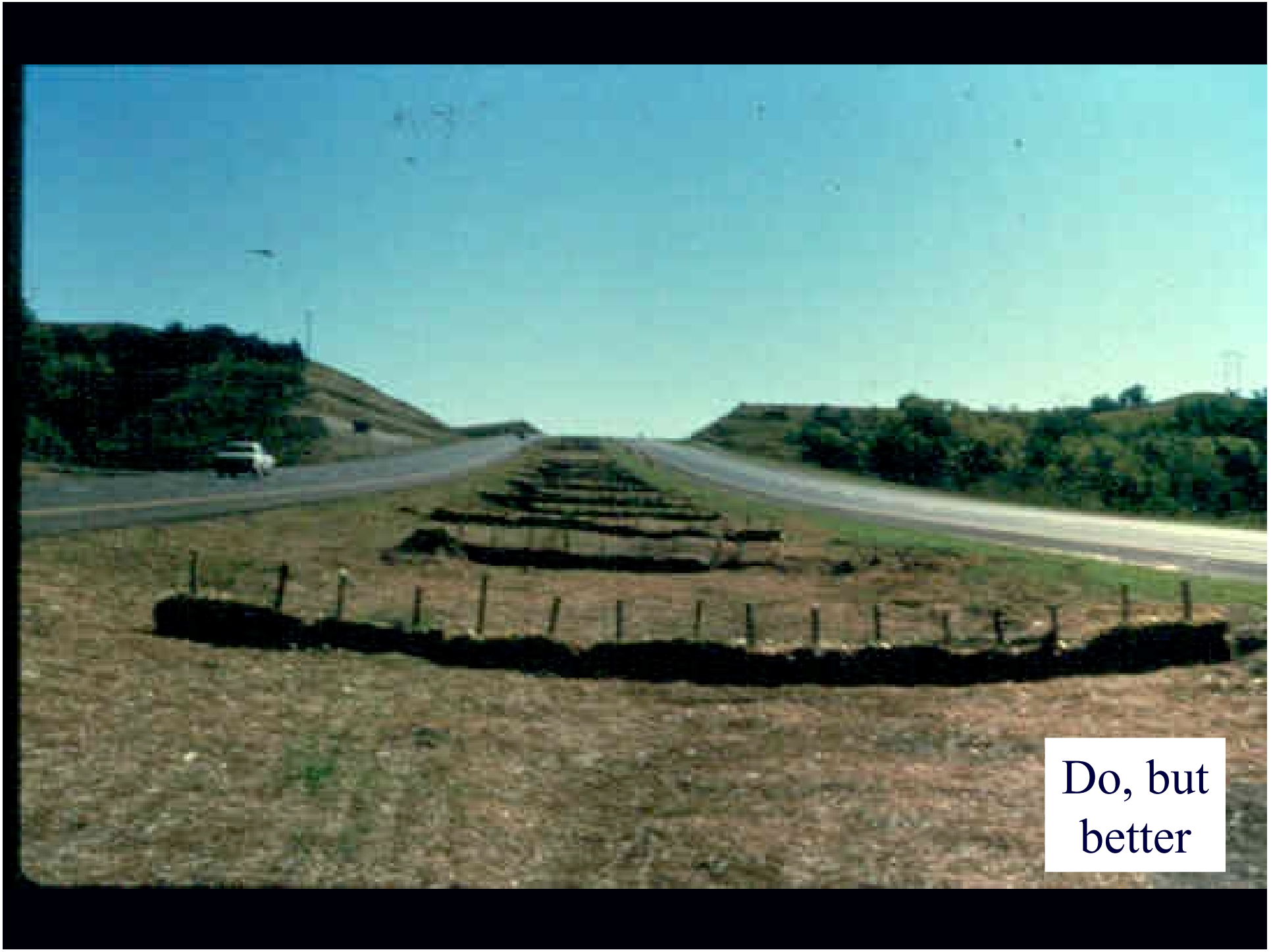
Don’t


Do


Do for as long as you can
Do only as long as you must


Don’t


Do
Don’t


Do, but
better


Don’t


Don’t?


Do, sort of


Don’t


Do
ROAD
CLOSED
Don’t

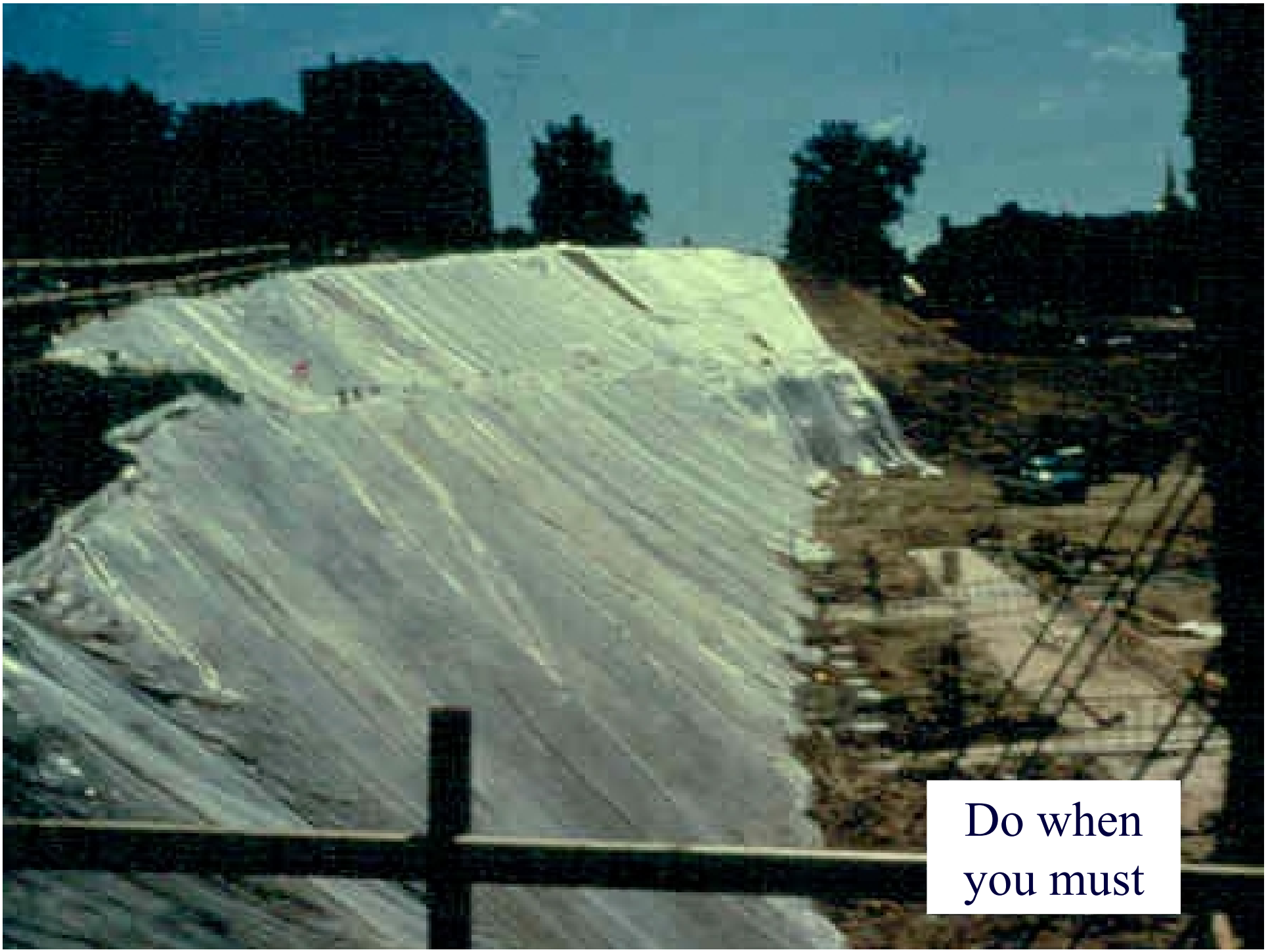

Don’t, but isn’t
it a marvel?


Don’t if you
can help it


Do


Don’t
Do


Do


Do when
you must

Storm Water Program Components

1. Public education and outreach
2. Public Involvement
3. Illicit discharge elimination
4. Land disturbance runoff control
5. Post-construction storm water management
6. Pollution prevention in municipal operations

Post-construction Storm Water Management

If you are not going to require good storm water management after construction, will requiring pre-construction BMPs do much good?

To do good post-construction storm water management, the developer must think about how to do it before construction starts.

What is Good Post-construction Management?

Repeat:

1. Get a reasonable amount of water back into the ground,
2. Convey leftover water to stream courses without undue erosion, sedimentation, habitat degradation or flooding.

Post-construction Storm Water Management

- Codify, as necessary, using ordinances and permitting processes
- Make developers plan well before construction
- Make them construct with BMPs
- Make them maintain facilities
- Charge fees to pay for storm water management program (utility)

Storm Water Utility Fees

To be considered fee and not a tax:

- must be equitable to all users (impervious surface area is a common criteria),
- must be based upon costs to run the program selected by the governing body, not the other way around.

Courts have held that fees set inequitably, or too high or too **low** to run the selected program, are taxes.

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P^2 in Municipal Operations

- Use good housekeeping practices.
- Purchase land or easements for floodways, riparian corridors, detention systems.
- Keep community lands undisturbed or build storm water management into lands, roads, storm drains.

P^2 in Municipal Operations

- Practice BMPs on community projects and properties - retain trees and grasslands, use soil erosion control measures.
- Use municipal facilities and operations as demonstrations to citizens and businesses of how best to manage storm water.

Go Beyond BMPs

Do these and encourage these:

- Use “rain gardens,” infiltration swales
- Build oversized retention basins with slow release outfalls
- Modify ponds and lakes to store storm water
- Use wetlands, when feasible

Go Beyond BMPs

Do these:

- Manage whole watersheds
- Use and encourage special agreements between your community and others, developers, and areas that have been developed to jointly manage storm water

Storm water Management Summary

1. Think it through
2. Get help
3. Execute
   - Get a reasonable amount of water back into the ground,
   - Convey leftover water to stream courses without undue erosion, sedimentation, habitat degradation or flooding.

Technical and Financial Assistance Sources

Federal agencies

- Natural Resources Conservation Service
- USDA Rural Development
- Federal Emergency Management Agency
- Others

Technical and Financial Assistance Sources

State agencies

- Department of Natural Resources' Environmental Assistance Office, Soil and Water Conservation Program
- DED Community Development Block Grants

Soil and Water Conservation Districts

American Public Works Association

Regional Planning Commissions

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Questions?

Postscript

Storm Water Program Components

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Storm Water Factoids and Anecdotal Evidence

Storm water flow from soil results from:

1. Soil compaction
2. Bare soil

Soil treats storm water better than standing water does.

Detention "chokes off" about 15 % of peak flow, but does not approach performance of undisturbed land.

Storm Water Factoids and Anecdotal Evidence

- Turf grass on compacted soil is almost an impermeable surface.
- Geese populations have exploded in urban areas because they love short turf grass (they can see predators.) Leave vegetation tall around ponds.
- Open, broad, vegetated swales are a good storm water transport/treatment/infiltration technique, closed culverts are not.

Stormwater Factoids and Anecdotal Evidence

Mass grading (leveling) of development sites creates large storm water problems, stair-stepped and cluster developments, built in stages are better.

Filter strips and similar infiltration features for storm water function like some of the most effective wastewater treatment techniques.

Storm Water Factoids and Anecdotal Evidence

- Most storm water practices are designed for large storms, but about 80% of our precipitation comes in 1 inch or less events. Practical storm water practices are effective with the smaller events and rarely for the large ones. We need to change our emphasis.
- We need to infiltrate storm water on-site more, and transport it less.

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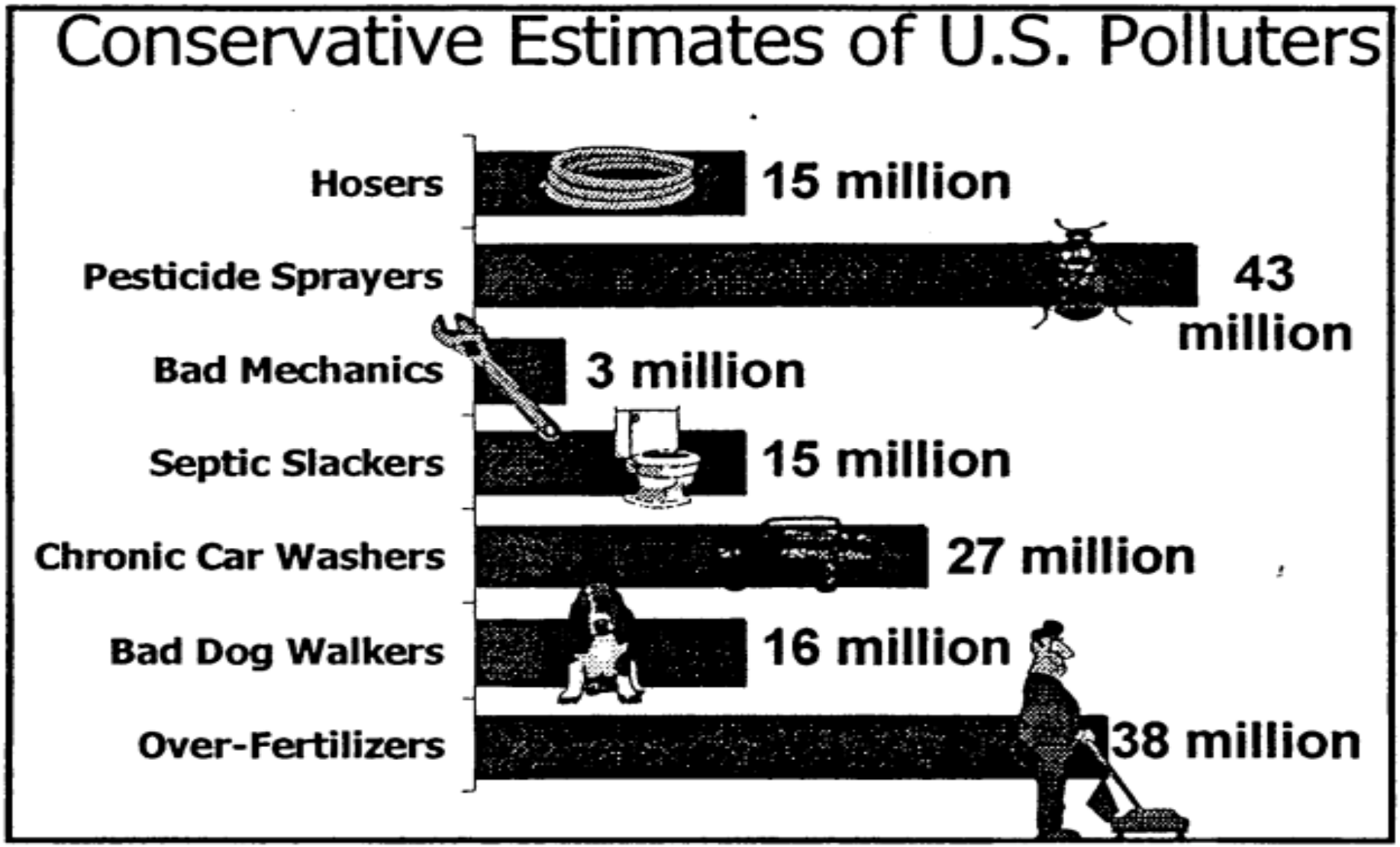
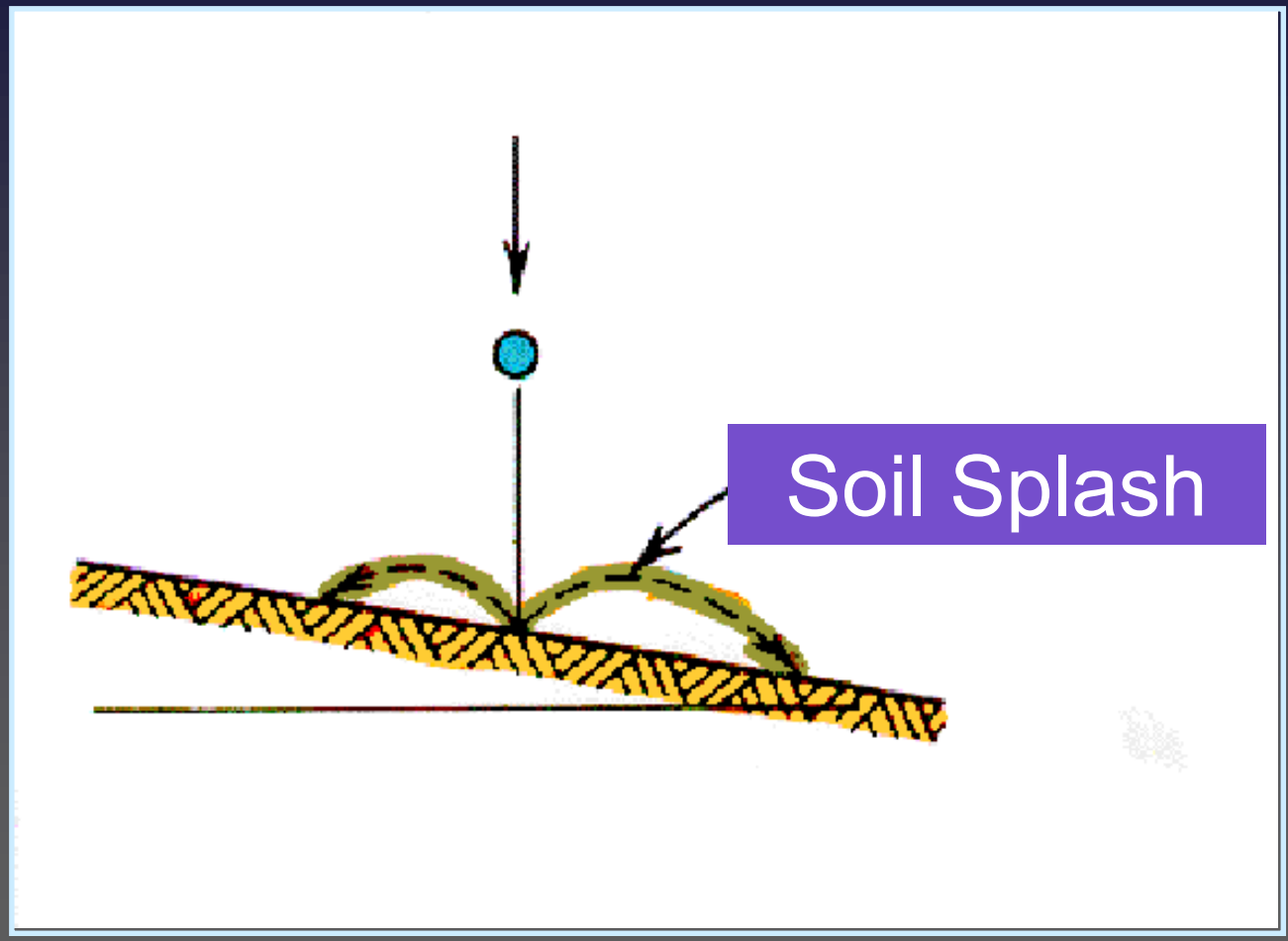
Center for Watershed Protection
Ellicott City, Maryland



Erosion Starts With One Raindrop



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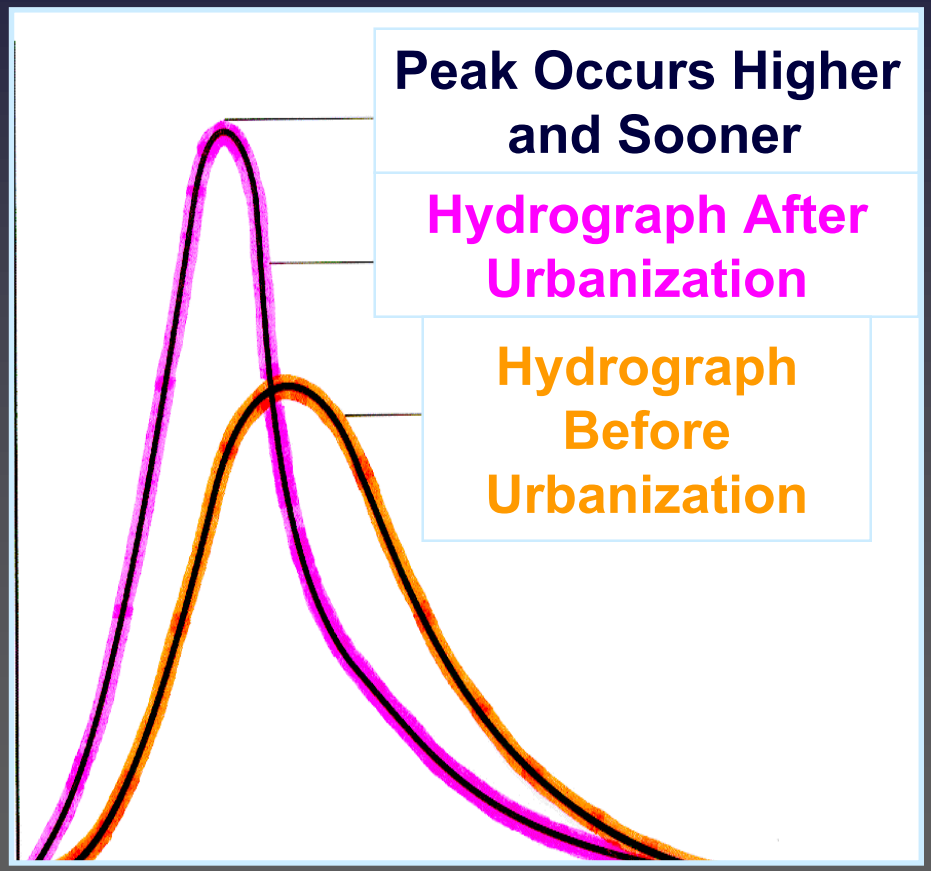
Community Impacts on Storm Water



Higher flood levels

Lower stream low flows

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Community Impacts on Storm Water

- More soil and streambank erosion
- Sediment and pollutants foul streams and lakes
- Higher in-stream water temperatures
- Reduced and degraded groundwater recharge

Storm Water Impacts on Communities

Loss of life

Lower quality of life

Flood damage to property

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Storm Water Impacts on Communities

Higher flood insurance costs

Higher initial construction costs to make buildings and facilities flood proof

Slide Tour

The “do’s and don’t of storm water management for land disturbers

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Don’t


Don’t


Don’t


Don’t


Don’t


Don’t


Don’t


Don’t


Don’t
big-time


Do


Do


Don’t


Don’t if you
can help it


Don’t if you
can help it

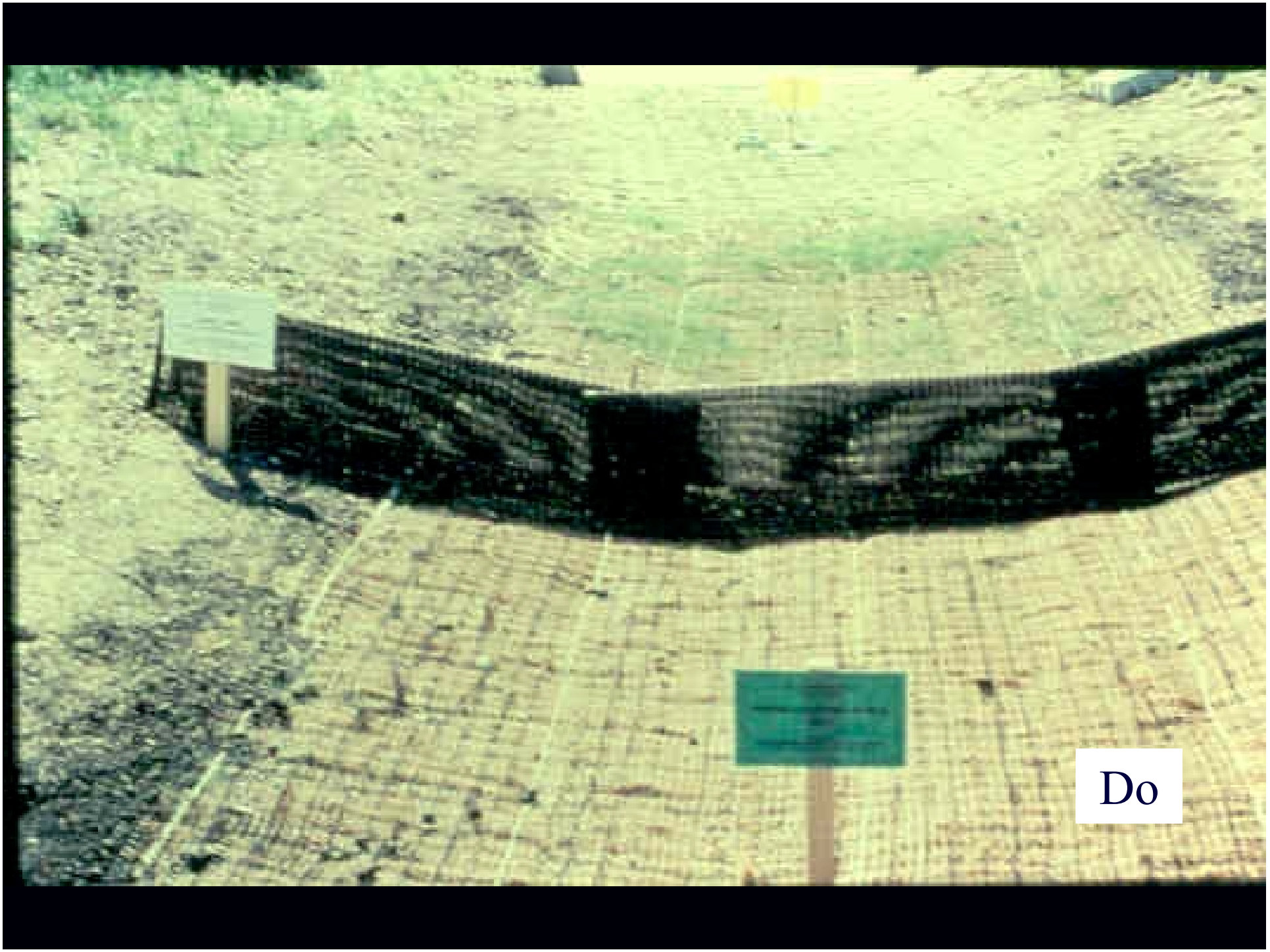

Do only if
you must


Do


Do


Do hydro-
mulch


Do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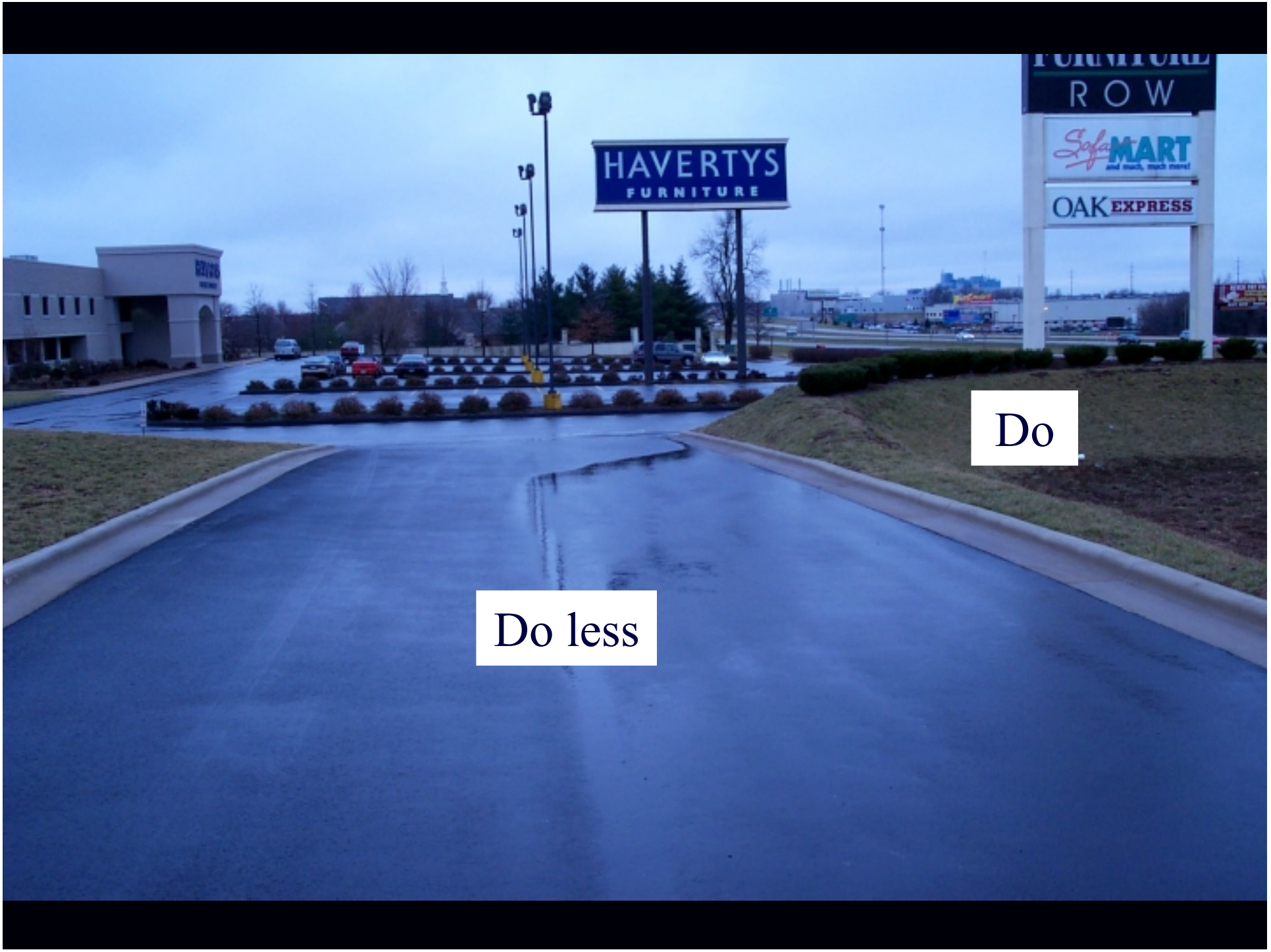
HAVERTYS
FURNITURE
ROW
SofaMART
OAK EXPRESS
Do
Do less


FURNITURE
ROW
Sofa MART
and much, much more!
OAK EXPRESS
Do


Do


Do


Southern Materials
Company
Do


Do
Do less


Do, but
better


Don’t


Don’t
Do


Don’t


Don’t


Don’t

Storm Water Program Components

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Meet if you can:

Inform

Persuade

Let citizens vent

Be productive

Or if it is required

If You Meet, Handle These Well

- Sunshine Law
- Facilitator vs. participant?
- Preparation
- Timing
- Facilities
- Media
- Advertising
- Meeting control - flexible and rigid
- Agenda and time limits
- Encourage input
- Control "CAVE" people and "contrarians"

Getting the Information Out There

- Construction, business and other permit application attachments
- Newspaper articles and other media releases
- Newsletters and billing inserts
- Seminars and workshops
- Word of mouth
- Home page
- Traveling information display

Storm Water Utility Development Steps

1. Design desired program, including its cost
2. Estimate fees needed
3. Set fees
4. Run and monitor program
5. Periodically repeat steps, in order

Funding Sources

ORDINANCE NO. 1996-15

Establishing a Storm Water Management Fee System

WHEREAS, **the City of ...; and**

WHEREAS, **the City wishes to enact a stormwater management fee system ...**

Fees (storm water utility)

Taxes

Storm water grants - not likely

Project grants including storm water components - more likely